OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

B621/01

SCIENCE B

Unit 1 Modules B1 C1 P1 (Foundation Tier)

OCE/30355

Candidates answer on the Question Paper
A calculator may be used for this paper

OCR Supplied Materials:
None

Other Materials Required:
- Pencil
- Ruler (cm/mm)

Friday 28 May 2010
Morning

Duration: 1 hour

B621010

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

MODIFIED LANGUAGE

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and question number(s).

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- A list of physics equations is printed on page two.
- The Periodic Table is printed on the back page.
- The total number of marks for this paper is **60**.
- This document consists of **24** pages. Any blank pages are indicated.

EQUATIONS

$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}}$$

wave speed = frequency × wavelength

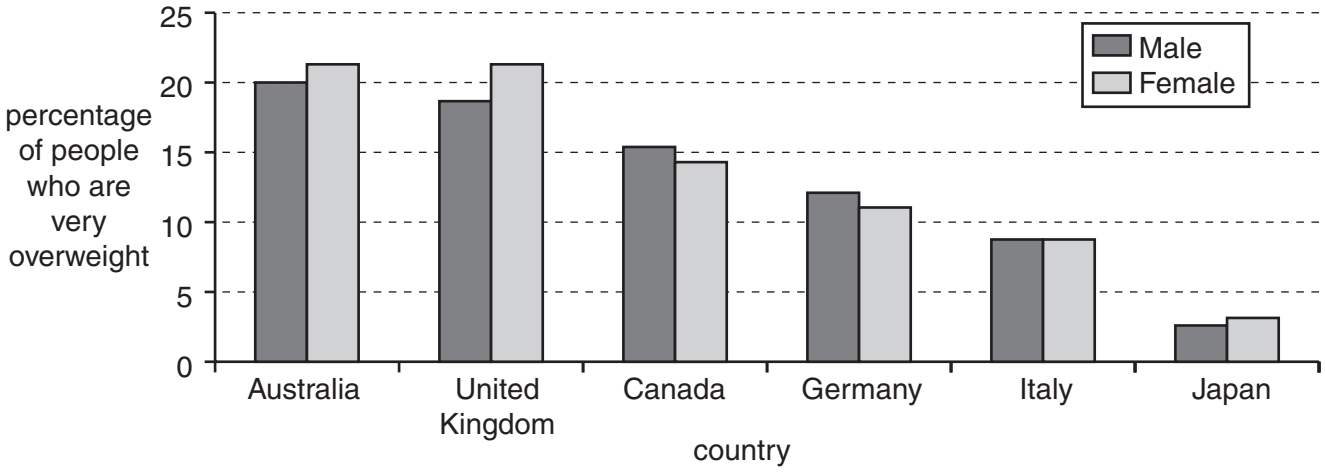
power = voltage × current

energy (kilowatt hours) = power (kW) × time (h)

Answer **all** the questions.

Section A – Module B1

1 The graph shows the percentage of very overweight (obese) people in six countries.



(a) Some of these countries have a higher percentage of obese men than obese women.

Write down the names of these countries.

..... **[1]**

(b) Eating too much of which nutrient is most likely to cause obesity?

Put a (ring) around the correct answer.

carbohydrate **fibre** **iron** **vitamin C**

[1]

(c) Write down **one** health risk of being obese.

..... **[1]**

[Total: 3]

2 **(a)** Most people take their hands away very quickly if they pick up a hot object.

They do not have to think about doing this.

What type of action is this?

Choose your answer from:

hormone action

simple reflex

voluntary response

answer ..... **[1]**

(b) The pain caused by the hot object is detected by pain receptors in the skin.

Write down the name of **one other** type of receptor in the skin.

..... **[1]**

(c) Nerve cells carry impulses from the pain receptors to the central nervous system.

Put a tick (✓) next to the type of nerve cells that carry these impulses.

motor neurone	☐
relay neurone	☐
sensory neurone	☐

[1]

(d) Scientists have been investigating a young boy and his family.

The family cannot feel pain.

This is because they all have inherited a change in a single gene.

The gene codes for a substance that turns on the nerve cells that carry pain messages.

This substance is not made in people with the faulty gene.

(i) The relatives all have a copy of the gene that has been changed.

What is the name given to change in a gene?

..... **[1]**

(ii) Where would scientists find the faulty gene in the cell?

Choose your answer from this list.

cell membrane

cytoplasm

nucleus

vacuole

answer..... **[1]**

[Total: 5]

3 Anthony and Declan are talking about their fitness.

They both measure their resting pulse rate and blood pressure.

Anthony	**Declan**
Resting pulse rate 95 Blood pressure 150/95 mmHg	Resting pulse rate 75 Blood pressure 130/80 mmHg

(a) (i) Describe how Anthony and Declan could measure their pulse rates.

.....

..... **[1]**

(ii) Anthony's blood pressure is higher than Declan's.

This could be because of differences in their diets.

Finish this sentence to suggest **one** possible difference in their diets.

Anthony's diet might contain .....

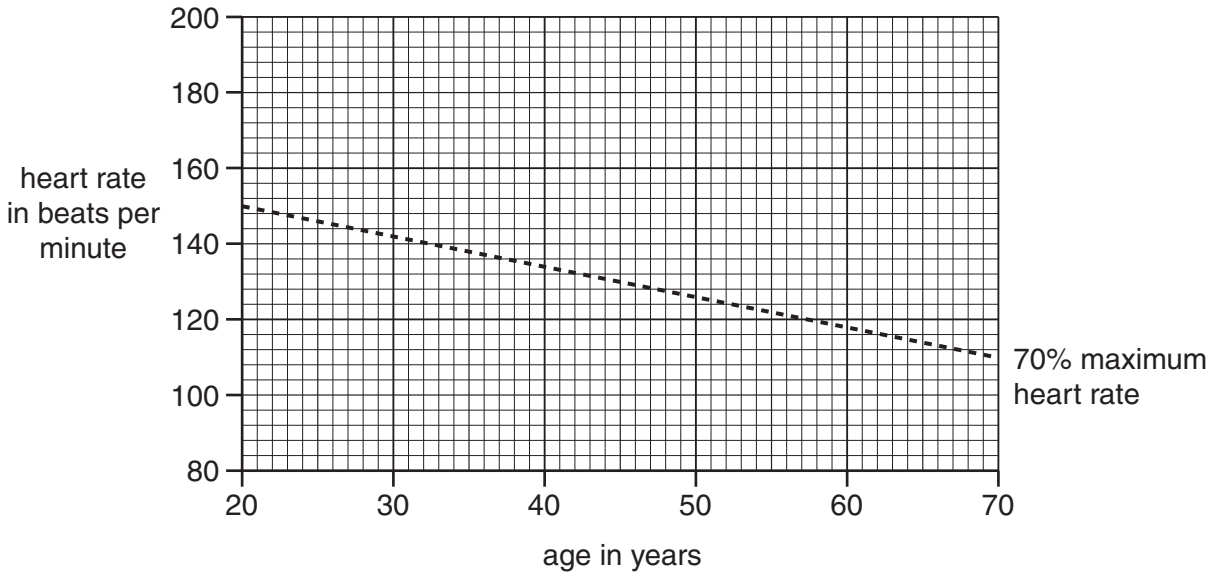
..... . **[1]**

(b) Anthony is 35 years old.

He decides to exercise to get fitter.

He reads in a book that his pulse rate should go up to 70% of its maximum value during exercise.

The book shows a graph.



(i) What should Anthony's pulse rate increase to when he exercises?

Use the graph to work out the answer.

answer …….. beats per minute. **[1]**

(ii) By increasing his pulse rate to 70% of its maximum value, Anthony should make sure that he respires aerobically not anaerobically.

Write down **one** advantage of respiring aerobically rather than anaerobically.

.....

..... **[1]**

(iii) Explain why it is necessary for a person's pulse rate to increase when they exercise.

.....

..... **[2]**

[Total: 6]

4 Jane and Sadia are planning a holiday to Africa.

(a) Jane is worried about getting cholera.

What type of microorganism causes cholera?

Put a (ring) around the correct answer.

bacterium **fungus** **protozoa** **virus** **[1]**

(b) Jane is unlikely to get malaria from drinking water.

How is malaria usually spread?

..... **[1]**

(c) Sadia says that our bodies have defences against pathogens.

The immune system is one of the body's defences against pathogens.

Write down **one** way that the immune system can destroy pathogens.

..... **[1]**

(d) A person develops a high body temperature if they have malaria.

(i) What is the **normal** human body temperature?

..... °C **[1]**

(ii) Explain how a very high body temperature can be harmful to the body.

.....

..... **[2]**

[Total: 6]

Section B – Module C1

5 This question is about food and food additives.

(a) An additive is given an E number.

Look at the table. It gives some information about E numbers.

type of food additive	E number range
food colours	E101 to E199
preservatives	E200 to E299
antioxidants	E300 to E321
emulsifiers and stabilisers	E400 to E499
sweeteners	E950 to E967

Look at the food label found on a packet of instant drink.

INGREDIENTS

Sugar, drinking chocolate, skimmed milk powder, vegetable oil, instant coffee, lactose, dried glucose syrup, E340, E452, E331, milk proteins, salt

(i) What type of additive is E452?

..... **[1]**

(ii) Which ingredient is present in the **greatest** amount?

..... **[1]**

(b) Some foods contain oil and water.

Sometimes they contain an emulsifier.

What is the job of an emulsifier?

..... **[1]**

(c) Antioxidants are added to some foods.

Explain why.

..... **[1]**

(d) Potatoes have to be cooked before they are eaten.

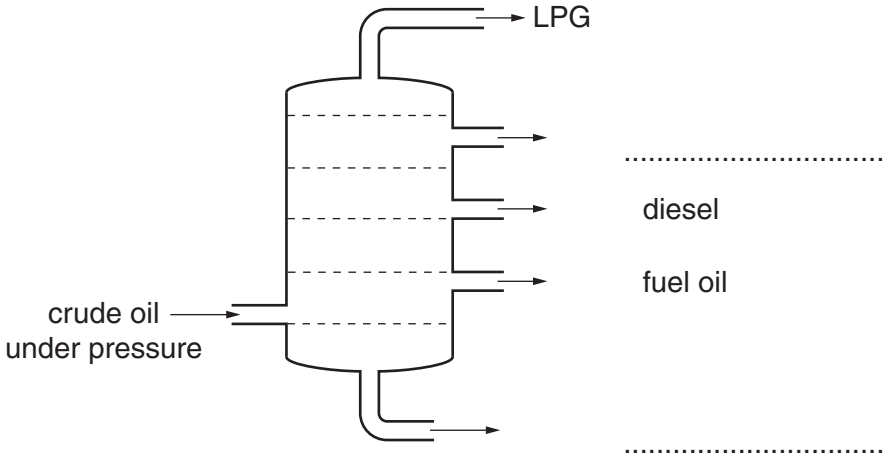
How does potato change when it is cooked?

..... **[1]**

[Total: 5]

6 This question is about fractional distillation and cracking.

Look at the diagram. It shows a fractionating column.



Fractional distillation separates crude oil into **fractions**.

(a) Complete the diagram to show the missing fractions.

Choose from:

bitumen

heating oil

petrol

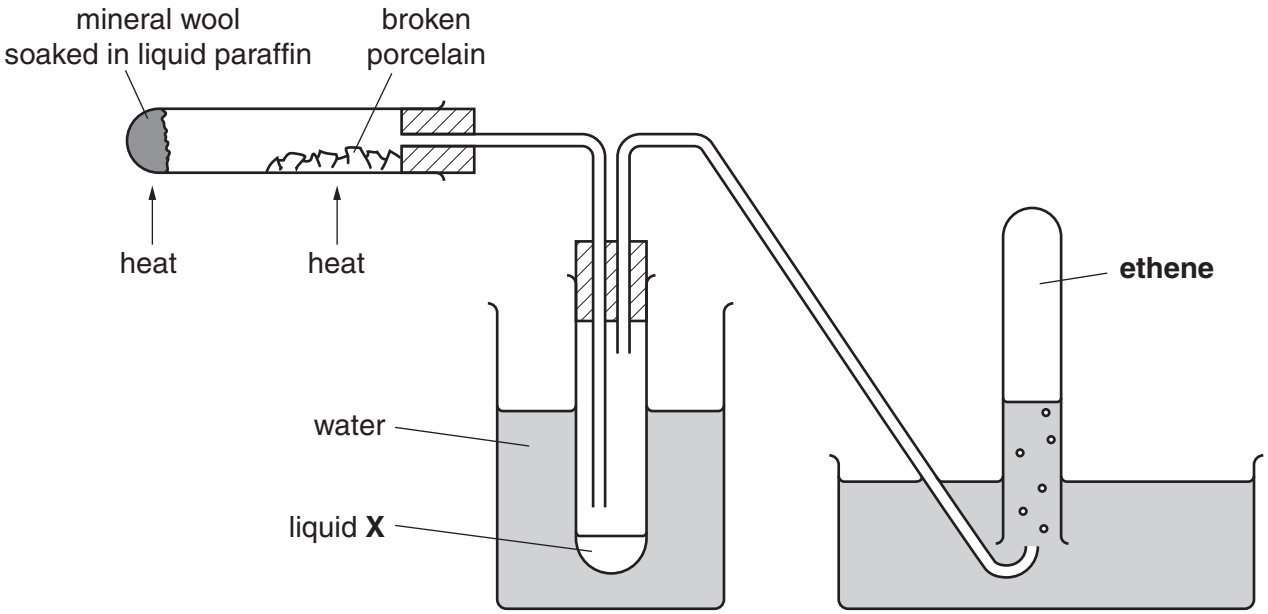
waxes

[2]

(b) Some of the fractions from crude oil can be **cracked**.

Look at the diagram.

It shows how Julie does this in the laboratory using liquid paraffin.



(i) What is the job of the broken porcelain?

..... **[1]**

(ii) Write down the name of liquid **X**.

..... **[1]**

(c) Crude oil is carried in ships to oil refineries.

Sometimes crude oil is spilled into the sea.

Write about the problems caused when this happens.

.....

.....

..... **[2]**

[Total: 6]

7 Liz is designing a new power station.

She must choose a fuel to burn in the power station.

The cost of the fuel is one of the factors she needs to consider.

(a) Write about the **other** factors Liz needs to think about when she chooses the fuel.

.....

.....

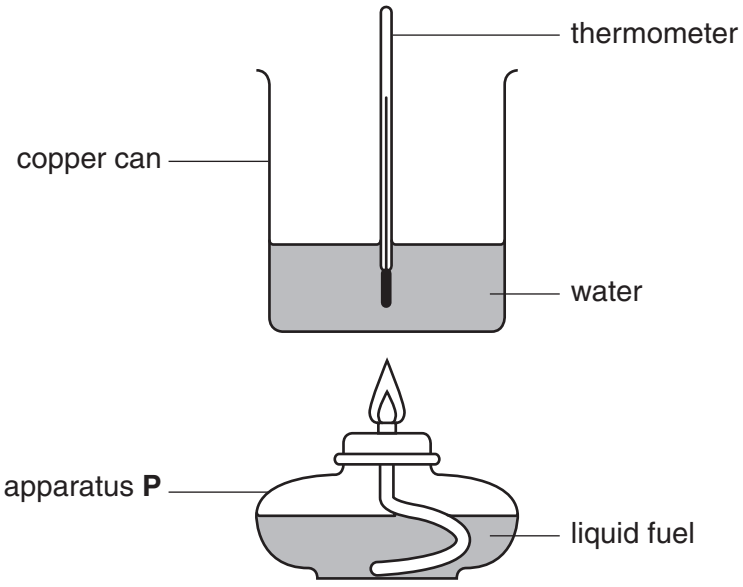
..... **[2]**

(b) A gas from the air is used up when fuels burn.

Write down the name of this gas.

..... **[1]**

(c) Look at the diagram. It shows the apparatus Liz uses to compare three fuels.



(i) What is the name of apparatus **P**?

..... **[1]**

(ii) Look at the table. It shows Liz's results.

Complete the table.

fuel	temperature at start in °C	temperature at end in °C	temperature change in °C
petrol	20	62	42
paraffin	22	60	38
ethanol	.....	55	30

[1]

(iii) Liz burns 1.0 g of each fuel.

Which fuel gives off **least** energy?

.....

Explain your answer.

.....

..... **[2]**

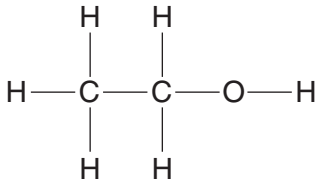
(d) Burning fuels is an **exothermic** reaction.

What is meant by an exothermic reaction?

.....

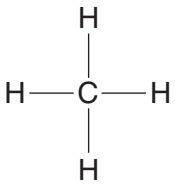
..... **[1]**

(e) Look at the displayed formulas of some fuels.

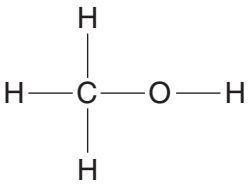


ethanol

hydrogen



methane



methanol

Which fuel is a **hydrocarbon**?

answer ..... **[1]**

[Total: 9]

Section C – Module P1

8 **(a)** Look at the statements about **microwaves**.

Some statements are true and some are false.

Put a tick (✓) in the correct box next to each statement.

Two have been done for you.

	true	**false**
They are electromagnetic waves.		
They are longitudinal.		✓
They penetrate to the centre of all foods.		
They are absorbed by water molecules.	✓	
They can go through plastic.		
They are reflected by metals.		
They can be absorbed by body tissues and cause burns.		

[2]

(b) Some people are concerned about children using mobile phones.

Mobile phones use **microwave** signals.

Write down **two** reasons why people are concerned about children using mobile phones.

1.....

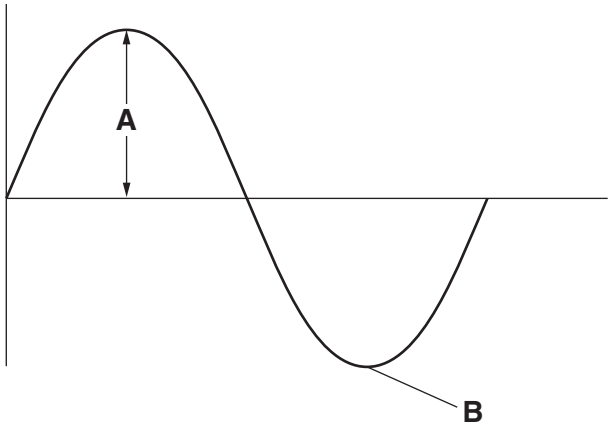
.....

2.....

..... **[2]**

[Total: 4]

9 **(a)** Look at the diagram of a wave.



(i) Write down the name of distance **A**.

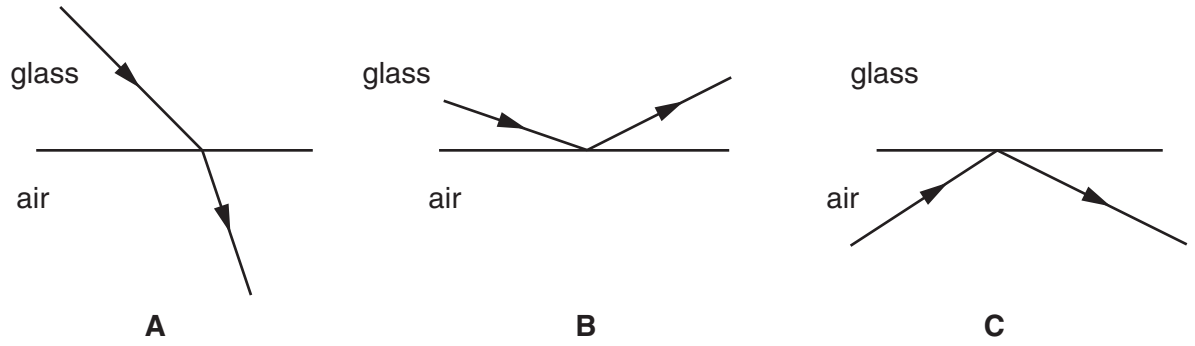
A is the ……..of the wave. **[1]**

(ii) Write down the name of point **B**.

B is the ……..of the wave. **[1]**

(b) Look at the three diagrams.

They show the path of light at the boundary between glass and air.



A **B** **C**

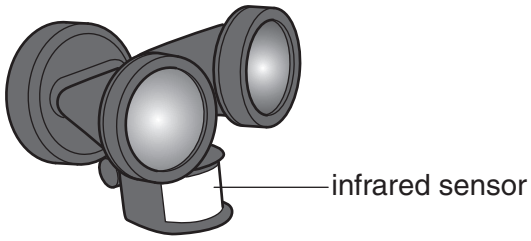
Which diagram shows total internal reflection (TIR)?

Choose from: **A** **B** **C**

answer ..... **[1]**

(c) Infrared sensors are used to switch on security lights when someone moves near the detector.

The sensors detect infrared radiation.



Where does the infrared radiation that is detected come from?

.....

..... **[1]**

[Total: 4]

10 (a) Look at the list.

It shows some of the waves given out by the Sun.

infrared

ultraviolet

visible light

X-rays

Which type of wave causes sunburn?

Choose your answer from the list.

..... **[1]**

(b) Scientists believe that global warming is caused by an increase in carbon dioxide in the atmosphere.

Where does this **extra** carbon dioxide come from?

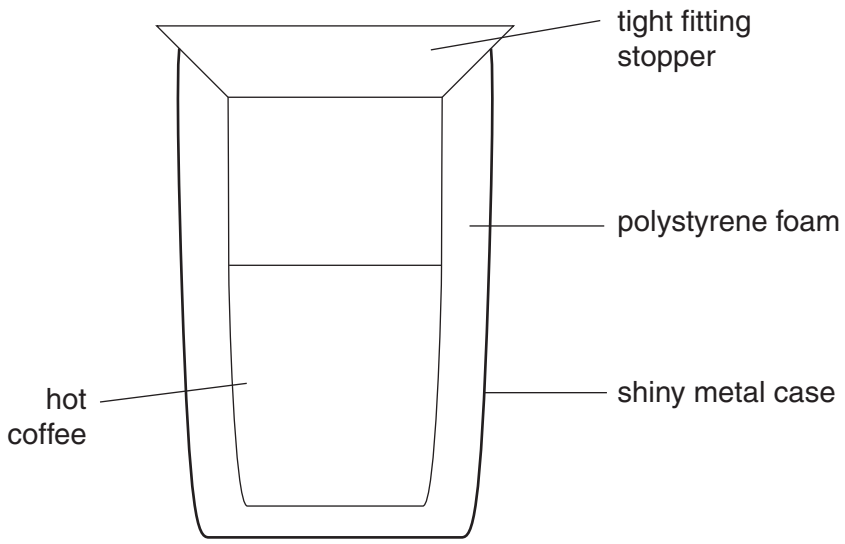
.....

..... **[1]**

[Total: 2]

11 (a) Look at the diagram of a thermal mug.

It is used to keep coffee hot.



Explain how the thermal mug reduces energy transfer.

In your answer write about

- conduction
- convection
- radiation.

.....

.....

.....

.....

..... **[3]**

Turn over for the remainder of question 11

(b) Look at the information about energy saving methods.

insulation method	cost to fit in £	payback time in years	savings each year in £	energy saved each year in kWh
cavity wall insulation	960	4.0	240	2000
double glazing	3000	15.0	200	1667
draught excluders	48	0.5	96	800
loft insulation	240	2.0	120	

Energy costs 12p per kWh.

How many kWh of energy does loft insulation save each year?

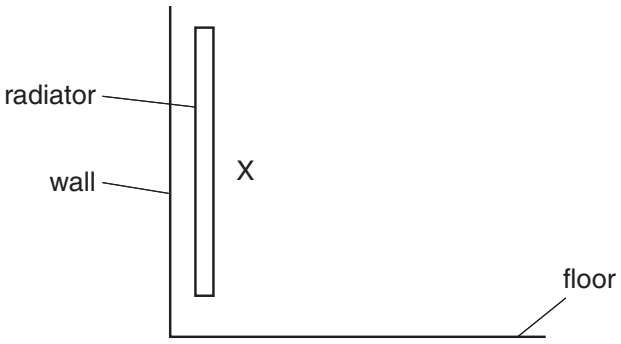
.....

.....

answer ..... kWh **[1]**

[Total: 4]

12 Look at the diagram of a radiator.



(a) The air next to the radiator gets hot.

Draw an arrow from X to show which way this air moves. **[1]**

(b) Air is a good insulator.

Insulation materials contain trapped air.

Polystyrene foam is one insulator that contains trapped air.

Write down one **other** insulating **material** that contains trapped air.

..... **[1]**

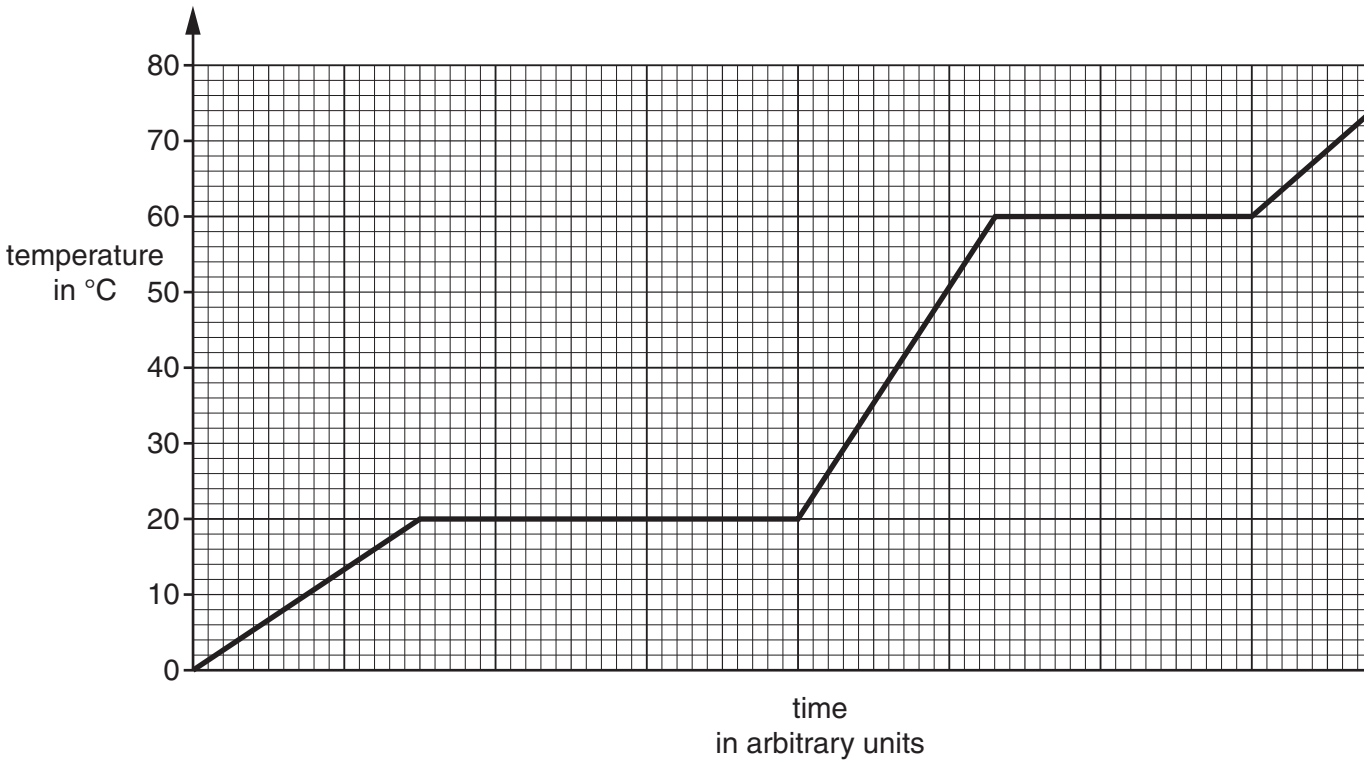
[Total: 2]

13 (a) This question is about heat and radiation.

Look at the graph.

It shows how the temperature of a substance changes when it is heated.

The substance is a solid at 0 °C.



What temperature is the melting point?

answer ..... °C **[1]**

(b) Look at the table of five identical objects.

They are painted five different colours.

object	colour
A	dull black
B	shiny black
C	shiny silver
D	dull silver
E	shiny white

(i) The five objects are all at the same temperature.

Which object **absorbs** the most radiation? ..... **[1]**

(ii) What is the name of the radiation that is absorbed?

..... **[1]**

(iii) All the objects emit (give out) radiation.

Jan wants the objects to emit **more** radiation.

She cannot change their colours.

What else could she do to the objects?

..... **[1]**

[Total: 4]

END OF QUESTION PAPER

The Periodic Table of the Elements

1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										4 **He** helium 2
7 **Li** lithium 3	9 **Be** beryllium 4											11 **B** boron 5	12 **C** carbon 6	14 **N** nitrogen 7	16 **O** oxygen 8	19 **F** fluorine 9	20 **Ne** neon 10
23 **Na** sodium 11	24 **Mg** magnesium 12											27 **Al** aluminium 13	28 **Si** silicon 14	31 **P** phosphorus 15	32 **S** sulfur 16	35.5 **Cl** chlorine 17	40 **Ar** argon 18
39 **K** potassium 19	40 **Ca** calcium 20	45 **Sc** scandium 21	48 **Ti** titanium 22	51 **V** vanadium 23	52 **Cr** chromium 24	55 **Mn** manganese 25	56 **Fe** iron 26	59 **Co** cobalt 27	59 **Ni** nickel 28	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	128 **Te** tellurium 52	127 **I** iodine 53	131 **Xe** xenon 54
133 **Cs** caesium 55	137 **Ba** barium 56	139 **La*** lanthanum 57	178 **Hf** hafnium 72	181 **Ta** tantalum 73	184 **W** tungsten 74	186 **Re** rhenium 75	190 **Os** osmium 76	192 **Ir** iridium 77	195 **Pt** platinum 78	197 **Au** gold 79	201 **Hg** mercury 80	204 **Tl** thallium 81	207 **Pb** lead 82	209 **Bi** bismuth 83	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

**** The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.***

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number